

Hydrologic Criteria Document Outline

Document Objective

- To summarize existing narrative ecological flow criteria and identify considerations for either developing narrative criteria or translating narrative hydrologic criteria to numeric criteria, including case studies in a flexible, non-prescriptive, and concise informational document

1. Introduction

- 1.1. WQS Overview: Introduce aspects of the CWA and explain water quality criteria in WQS to the flow manager audience who may not be familiar with the CWA.
 - 1.1.1. What are Water Quality Standards (WQS)?
 - 1.1.2. What are Existing and Designated Uses (EU's and DU's)?
 - 1.1.3. What are Water Quality Criteria?
 - 1.1.4. What has EPA issued as criteria in the past?

2. Problem Formulation

- 2.1. Landscape Context
 - 2.1.1. Natural condition and variation characterization
 - 2.1.1.1. What are the geographic boundaries, how do they relate to the functional characteristics of ecosystem?
 - 2.1.1.2. What are the key abiotic factors influencing the ecosystem (e.g., climate factors, geology, hydrology, soil type)?
 - 2.1.1.3. Where and how are functional characteristics driving the ecosystem (e.g., energy source and processing, nutrient cycling)?
 - 2.1.2. Classification scheme
- 2.2. Stressor/Source
 - 2.2.1. Stressor and Source Characteristic
 - 2.2.1.1. What are the sources of flow alteration?
 - 2.2.1.2. What is its magnitude and extent of disruption (scale)?
 - 2.2.1.3. What its magnitude, frequency, duration, timing, rate? (Establish Natural Flow Paradigm v. Altered)
 - 2.2.1.3.1. Sensitive/critical life stages and/or ecosystem events
 - 2.2.2. Mode of Action
 - 2.2.2.1. How does the altered flow affect organisms or ecosystem functions (general- literature review)?
 - 2.2.3. Overview/Alteration
- 2.3. Conceptual Model
 - 2.3.1. General Risk Hypothesis (from conceptual diagram)
 - 2.3.2. Conceptual Diagram
- 2.4. Analysis Plan
 - 2.4.1. Stressor of Concern
 - 2.4.2. Baseline (allowable change from baseline)
 - 2.4.2.1. What is the allowable change from baseline? (hydrologic alteration of integral aspects of flow) to protect integrity of the ecosystem)
 - 2.4.3. Measures of Effect (Measurement and Assessment Endpoints)

- 2.4.3.1. What ecosystems are potentially at risk? Why?
- 2.4.3.2. How do the characteristics of these ecosystems influence their sensitivity to flow alteration?
- 2.4.3.3. Are there unique features that are particularly valued?
- 2.4.3.4. What ultimately is the object of protection?
 - 2.4.3.4.1. What aspects of streamflow variability are most integral to maintaining structural and functional integrity of aquatic ecosystems (necessary to support designated uses)?
 - 2.4.3.4.2. How does this vary regionally and by river/stream type and classification?
- 2.4.3.5. What options exist for a baseline/reference condition for these integral aspects of flow variability?
- 2.4.3.6. What are we trying to assess (characteristics of flow baseline)?
 - 2.4.3.6.1. What are the functional relationships between flow and ecological endpoints (i.e., designated use attainment) and what do we need to know regarding relationship between flow alteration and ecological response?
 - 2.4.3.6.1.1. What types of ecological information are available (e.g., field surveys, laboratory tests, or structure-activity relationships)?
 - 2.4.3.6.1.2. How can the effects expected from altered flows be used in measurements/assessment endpoints? (Eco-flow relationships)
 - 2.4.3.6.1.3. Under what circumstances will effects occur?
- 2.4.4. Planned Analysis
 - 2.4.4.1. How can we measure this, what options are available?
 - 2.4.4.2. Assessment tools for quantitative approaches to translate a narrative water quality standard?
- 2.4.5. Data gaps (accumulated throughout the entire problem formulation)
- 3. **Narrative Criteria:** Summarize components of narrative criteria and available language options. Discuss legal/policy issues
 - 3.1. What are WQS?
 - 3.1.1. Designated uses (and existing uses that cannot be removed):
 - 3.1.1.1. Examples: aquatic life, primary contact recreation, public water supply, agriculture, industrial, navigation, ceremonial, shellfish harvesting areas, wildlife protection, drinking water source protection, and hydroelectric. Here, the focus is aquatic life protection.
 - 3.1.1.2. DU's need to be protected, regardless of if a criterion exists or not.
 - 3.1.2. Antidegradation policy,
 - 3.1.3. Criteria
 - 3.2. What are narrative criteria (v. numeric), and why do states and tribes use them?
 - 3.2.1. Broad application (v. site specific)
 - 3.2.2. Flexible- can be tailored to management goals in quantitative translation
 - 3.3. How are narrative criteria expressed in state and tribal WQS?
 - 3.3.1. Applicability options
 - 3.3.1.1. General, applying to all surface waters
 - 3.3.1.2. Specific to a particular designated use or site (or activity, e.g., Region 1)
 - 3.4. How do states and tribes use narrative criteria to protect hydrologic condition both

- within and outside of the WQS/CWA framework?
- 3.4.1. State and tribe examples (w/in and out WQS)
- 3.4.2. Advantages of developing criteria for hydrologic condition
 - 3.4.2.1. Designated use protection is the goal of criteria
 - 3.4.2.2. Implementable in other CWA programs (e.g., TMDL and NPDES permits)
- 3.5. What are components of narrative criteria for protecting hydrologic condition?
 - 3.5.1. Various endpoints/Object of protection (e.g., aquatic life designated uses, biological integrity)
 - 3.5.1.1. Example language
 - 3.5.1.1.1. Pros/Cons
- 3.6. How are narrative criteria implemented in other CWA programs?
 - 3.6.1. Translation into management of objectives and targets of other CWA programs (assessment, listing, anti-degradation, 401 certifications, TMDLs and NPDES permits)
 - 3.6.2. Translation on a case-by-case basis- example
 - 3.6.3. Specific translation procedures in guidance
 - 3.6.3.1. Within WQS- example
 - 3.6.3.2. Outside WQS (instream flow program)- example
 - 3.6.4. Activities to protect hydrologic condition- meeting criteria
- 3.7. Legal and Policy Considerations
 - 3.7.1. 101(g) clarification
 - 3.7.1.1. Protecting designated uses, not allocating water rights
 - 3.7.2. Precedent
 - 3.7.2.1. Caselaw: Jefferson Co. PUD: quantity v. WQ distinction is artificial
 - 3.7.2.2. States and tribes already adopted narrative criteria for hydrologic condition

4. Quantification Approaches and Considerations for Methodology Application

- 4.1. Case studies and key technical elements and options for quantifying
 - 4.1.1. Hydrologic baselines
 - 4.1.2. Hydro-ecological endpoints and relationships
 - 4.1.3. Management targets
 - 4.1.4. Ecological flow needs to protect designated uses, especially for evaluating examples and incorporating lessons from case studies
- 4.2. Considerations for Managers Applying Technical Processes
 - 4.2.1. Regional applicability of methodologies to hydroclimate regions
 - 4.2.2. State agency and stakeholder involvement
 - 4.2.3. Potential conflicts with other uses or programs and State and regional water policies and laws (e.g., prior appropriation doctrine, riparian water rights)
 - 4.2.4. Scale of Application (e.g., sub-watershed to state-wide)

5. Conclusion